CLAIMS

What is claimed is:

1. A fuel cell comprising:

a membrane electrode assembly including an ionically conductive member and at least one electrode disposed at said ionically conductive member; and

an electrically conductive member adjacent said electrode and having a major surface with a flow field pattern patterned thereon defined by lands, said lands comprising conductive particles dispersed in a binder.

2. The fuel cell of claim 1, wherein the conductive particles are electrically conductive.

3. The fuel cell of claim 1, wherein the conductive particles are thermally conductive.

4. The fuel cell of claim 1, wherein the conductive particles are selected form the group consisting of carbon black, graphite, gold, and platinum.

5. The fuel cell of claim 1, wherein the binder is selected from the group consisting of polyimide, polyester, and epoxy.

6. The fuel cell of claim 1, wherein the electrically conductive member comprises a plate having said major surface.

7. The fuel cell of claim 6, wherein said major surface of said plate faces said electrode, a diffusion medium is disposed between said major surface and said electrode, and said lands of said plate abut said diffusion medium.

8. The fuel cell of claim 7, wherein said gas diffusion medium is selected from the group consisting of carbon papers, carbon cloths, and carbon foams.

9. The fuel cell of claim 7, wherein said plate is formed of a material selected from the group consisting of metal, composite, and polymeric materials.

10. The fuel cell of claim 1, wherein the flow field comprises a plurality of lands that define a plurality of grooves therebetween; and the lands of the flow field include at least 50 percent of conductive particles and 50 percent of binder.

11. The fuel cell of claim 7, wherein a height of at least two of said lands varies between regions of the major surface of said electrically conductive member.

12. The fuel cell of claim 11, wherein the height varies between regions of said major surface according to compressive force exerted at said region respectively.

13. The fuel cell of claim 11, wherein the height is lower in a first said region which is under relatively high compressive force and the height is higher in a second said region which is under relatively low compressive force.

14. The fuel cell of claim 1, wherein variation in contact resistance between said regions is minimized by the height varying between said regions.

15. The fuel cell of claim 1, wherein said electrically conductive member comprises gas diffusion medium having said major surface with said flow field pattern.

16. The fuel cell of claim 14, wherein the gas diffusion medium is selected from the group consisting of carbon papers, carbon cloths, and carbon foams.

17. The fuel cell of claim 15, wherein said major surface of said diffusion medium faces away from said electrode and a current collector plate abuts said lands defined on said major surface of said diffusion medium.

18. A method of manufacturing a fuel cell comprising:

forming an electrically conductive fluid distribution element by depositing electrically conductive material on at least two spaced apart regions of a surface of a conductive substrate thereby defining lands in said regions; and

arranging a membrane electrode assembly and said fluid distribution element adjacent one another to form a fuel cell assembly.

19. The method of claim 18, wherein said forming is conducted by at least one of a direct writing method, an extrusion method, a mask method, and a decal transfer method.

20. The method of claim 18, wherein said depositing is conducted by varying a height of at least one of the lands.

21. The method of claim 18, wherein said membrane electrode assembly comprises an electrode having a plurality of alternating catalytic regions and non-catalytic regions, and

said arranging is conducted by aligning said lands with said non-catalytic regions.

22. The method of claim 18, wherein said electrically conductive material comprises conductive particles dispersed in a binder.

23. The method of claim 22, wherein said conductive particles are selected from the group consisting of carbon black, graphite, gold, and platinum.

24. The method of claim 22, wherein said binder is selected from the group consisting of polyimide, polyester, and epoxy.

25. A fuel cell comprising:

a membrane electrode assembly including an ionically conductive member and at least one electrode disposed at said ionically conductive member; and

an electrically conductive member adjacent said electrode and having a major surface with material deposited thereon forming a flow field pattern on said major surface.

26. The fuel cell of claim 25, wherein said electrically conductive member comprises gas diffusion medium having said major surface with said flow field pattern.

27. The fuel cell of claim 25, wherein said electrically conductive member comprises a plate and said flow field pattern is defined by lands on said major surface of said plate.

28. The fuel cell of claim 27, wherein said major surface of said plate faces said electrode, diffusion medium is disposed between said major surface and said electrode, and said lands of said plate abut said diffusion medium.